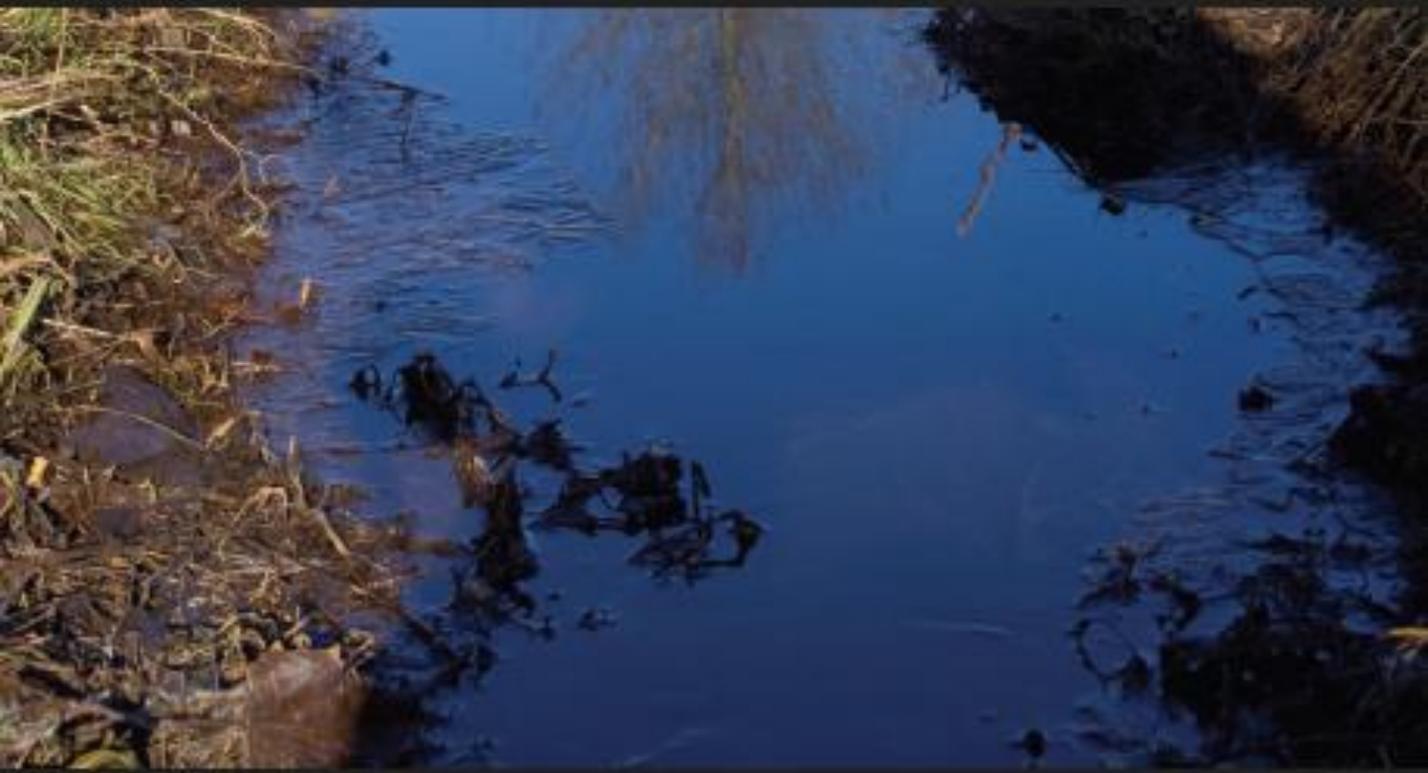




The Citizen's Guide to Stormwater Pollution Prevention
If it's on the ground, it's in your water!



Please report environmental violations to
305-455-6585 or to Miami Dade County "311"
www.cityofsweetwater.fl.gov

DISCLAIMER

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City of Sweetwater
Public Works Department
1701 NW 112th Avenue Unit 103
Sweetwater FL 33172
305.455.6585
www.cityofsweetwater.fl.gov





What's On Your Plate ?

Everything that goes into our storm drains makes its way to our rivers, lakes, and streams—to the places where we fish.

Never throw anything down the storm drain.

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305-455-6585 or to Miami Dade County "311"

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Chapter 1



What is Stormwater and Stormwater Runoff?

Stormwater is any precipitation from a storm event (rain, snow, sleet, etc). Stormwater runoff is any precipitation that does not soak into the ground but instead runs off its surface. Non-porous or impervious surfaces such as driveways, sidewalks, and streets block precipitation from soaking naturally into the ground. Stormwater can carry and deposit chemicals and other harmful substances into surface-water bodies.

Why should you care about Stormwater?

If stormwater is not managed properly, it can harm the environment causing:

- Increased risk of flooding
- Impaired water quality
- Increased surface runoff
- Increased soil erosion



Increased risk of flooding

High intensity thunderstorms and nowstorms are common in Dade County. Because urban areas have many impermeable surfaces, large volumes of water can enter the MS4. During a rain event, thousands of gallons of water must be transported away from the street as quickly as possible. If the MS4 is clogged with debris, storm systems can become blocked and overflow. Flooding can lead to loss of life, property and infrastructure damage.



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Impaired water quality

Contaminants, such as oil, grease, metals, and pesticides tend to build up on surfaces in urbanized areas. The contaminants come from sources such as pavement

deterioration, tire and brake pad wear, vehicle emissions and spills. They may also come from yard and garden care, and pet feces. Stormwater runoff picks up these substances and transports them DIRECTLY to lakes, streams, rivers, or wetlands. In most cases, whatever enters a storm sewer system is discharged UNTREATED into the water bodies we use for swimming and fishing and from which we get our drinking water. Degradation of water quality can also result in a decline in plant and animal diversity.

| STORMWATER CONTAMINANTS | SOURCES |
|-----------------------------------|---|
| Suspended Solids/Sediment | Construction sites & roads |
| Nutrients (Nitrogen & Phosphorus) | Fertilizers, pet wastes, yard wastes, soaps |
| Metals | Cars |
| Oil & Grease | Cars, leaks, spills |
| Bacteria | Pet wastes |
| Pesticides and Herbicides | Yard and garden care |

According to the United States Environmental Protection Agency (USEPA), pollutants in stormwater discharges remain a significant source of environmental impacts to water quality. The *National Water Quality Inventory, 2002 Report to Congress* provides a general assessment of water quality based on reports submitted by the states every 2 years under Section 305(b) of the Clean Water Act. This report indicates that stormwater discharges (from sources including separate storm sewers, construction, waste disposal, and resource extraction) are MAJOR causes of water quality impairment.

Key Terms:

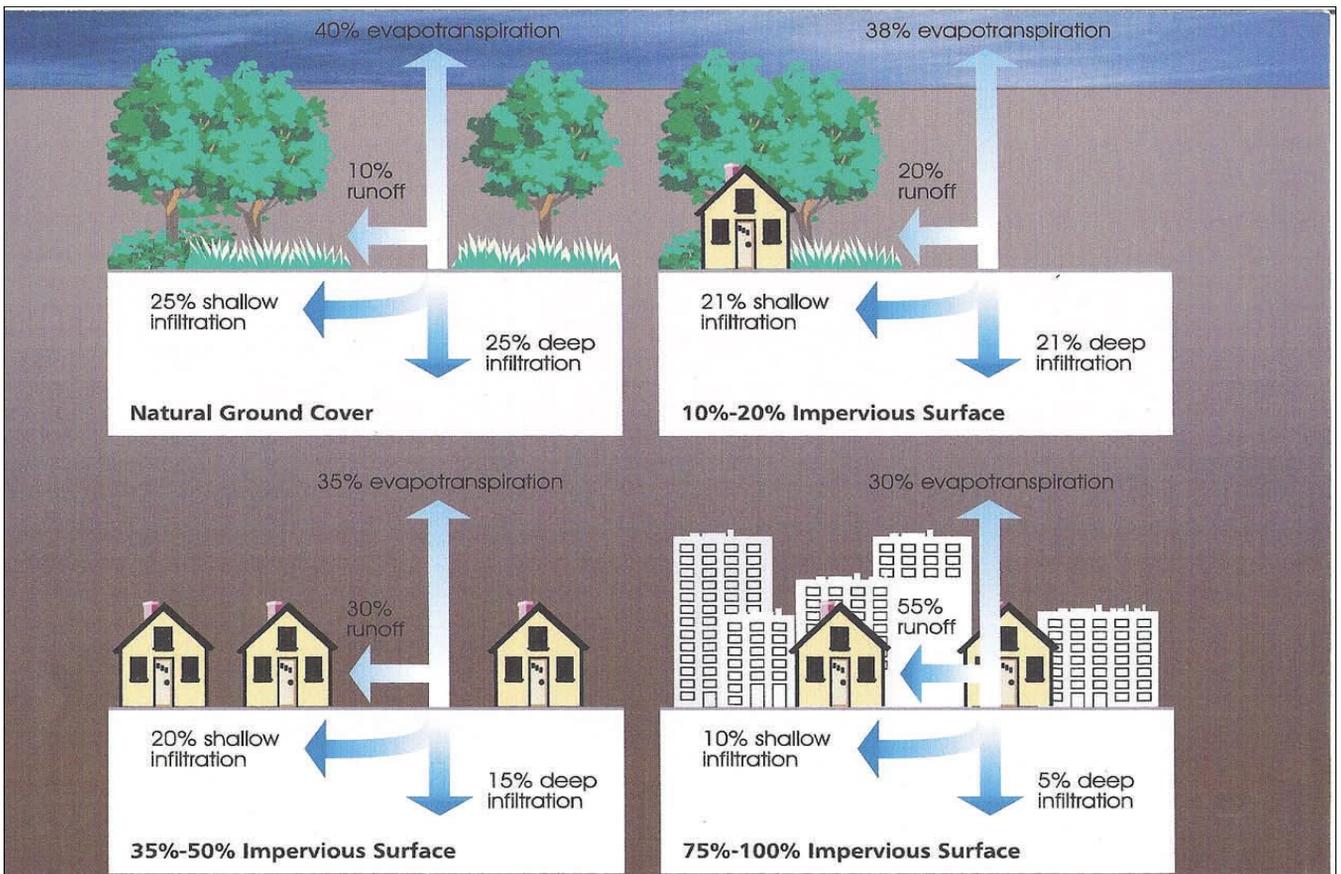
CLEAN WATER ACT (CWA): the primary federal law in the United States governing water pollution. Also known as the Federal Water Pollution Control Act. **WATER QUALITY:** the physical, chemical and biological characteristics of water. The term is most frequently used to explain a set of standards against which compliance can be assessed. In lay terms, it is the safety and/or purity of water.



Increased surface runoff

When materials impervious to water, such as pavement and concrete, cover the ground, runoff increases. Differences between areas with natural ground cover (before urban development) and those with impervious cover (after urban development) are shown below. As little as 10% impervious cover in an urban area can increase surface runoff and lead to water quality problems (Source: USEPA).

Increased surface runoff means that large volumes of water enter water sources more quickly (at higher velocities) which can cause river or stream bank erosion.



Increased soil erosion

Raindrops hitting the soil's surface and the movement of water (runoff) across it cause soil erosion. Disturbed soil, lack of vegetation, or both amplify such impacts increasing erosion. Poorly controlled construction sites are also a cause of soil erosion. Not only can these sites harm aquatic environments, but adjacent properties, public roadways and drainage systems..



Example of soil disturbance or erosion. Soil movement by rainfall is usually greatest and most noticeable during short-duration, high-intensity thunderstorms. Although the erosion caused by long-lasting and less-intense storms is not as spectacular or noticeable as that produced during thunderstorms, the amount of soil loss can be significant, especially when compounded over time. Runoff can occur whenever there is excess water on a slope that cannot be absorbed into the soil or trapped on the surface.

Chapter II

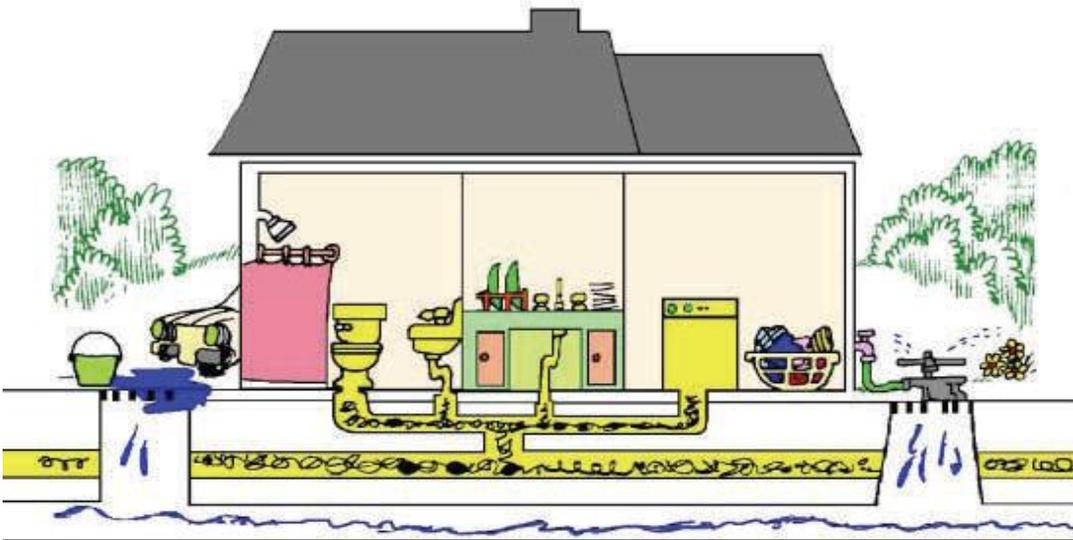
The Storm Sewer System versus Sanitary Sewer System: What's the Difference?

It's as simple as inside vs. outside.

Storm drain systems consist of natural and manmade channels and underground pipes that transport rainwater from streets, yards, rooftops, and other areas outside your home. This water goes directly to creeks, rivers, streams, and lakes carrying pollutants with it. Water entering the storm drain is not treated.

*Sanitary Systems are composed of a branching network of pipes and manholes. This system is used to collect and transport the water (also known as wastewater) from sinks, washing machines, toilets, and other indoor plumbing. **Wastewater entering the sanitary system flows** directly to a wastewater treatment plant where it is treated, disinfected, and then released to area water sources.*

These two systems are not connected.



LEFT:
The blue area in the figure represents the stormwater system (outside the home) while the yellow area represents the sanitary sewer system (inside the home).

RIGHT:
The figure shows both stormwater and sanitary underground system. Note that the systems are not interconnected.

Key Term:

WASTEWATER: Water that has been used, as for washing, flushing, or in a manufacturing process, and so contains waste products; sewage.

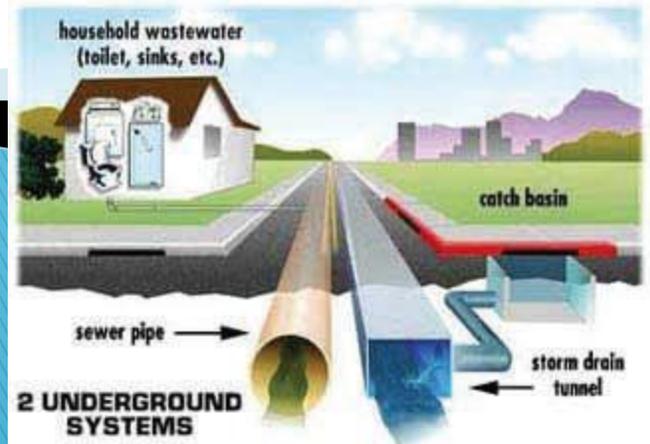


Photo provided by: City of Reno, NV.

Why Stormwater is not Treated

Many people wonder why stormwater goes untreated. Here's why: Simply, gutters (curb inlets/catch basins) are designed to prevent flooding. Their job is to remove water from the street as quickly as possible during a rainstorm or other precipitous event. The storm drain system they deposit into is designed to remove water from the streets and dispose of it quickly. The quickest way to dispose of thousands of gallons of water is to allow it to flow into rivers, lakes, or streams, *immediately*.



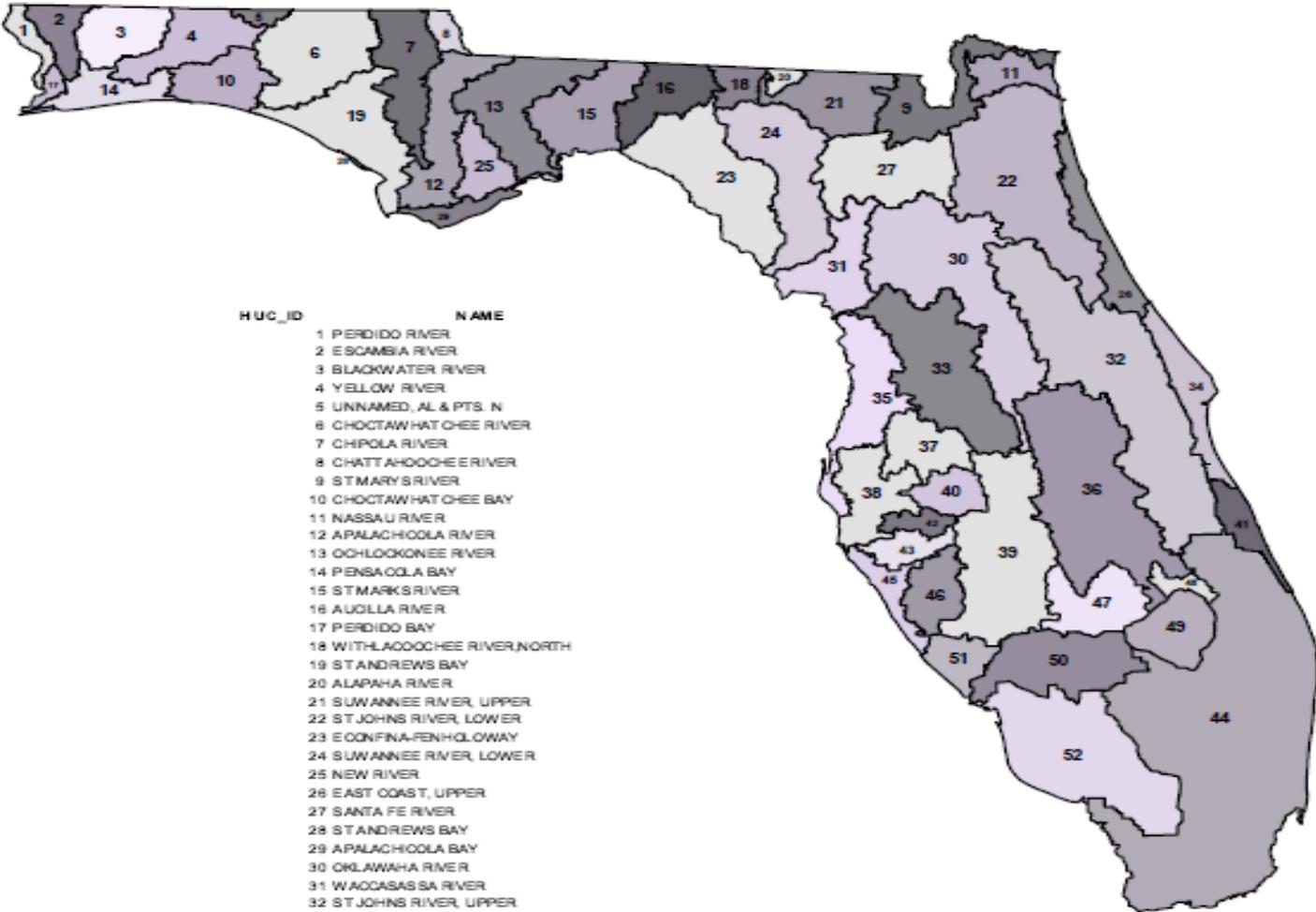
In addition, because stormwater comes in large amounts at unpredictable times, treating it as wastewater would be very expensive and quite unmanageable. If the sanitary and storm sewer systems were combined, many treatment plants would not be able to handle the quantity and velocities of water that intense storms produce



Watersheds

What is a watershed? A watershed is an area of land that catches rain and snow and drains or seeps into a water source, eventually making its way to lakes, rivers, and eventually the ocean. A watershed carries water “shed” from the land.

United States Geological Survey Hydrologic Unit Basins



| HUC_ID | NAME |
|--------|---------------------------|
| 1 | PERDIDO RIVER |
| 2 | ESCAMBIA RIVER |
| 3 | BLACKWATER RIVER |
| 4 | YELLOW RIVER |
| 5 | UNNAMED, AL & PTS. N |
| 6 | CHOCTAWHATCHEE RIVER |
| 7 | CHIPOLA RIVER |
| 8 | CHATTahoochee RIVER |
| 9 | ST MARY'S RIVER |
| 10 | CHOCTAWHATCHEE BAY |
| 11 | NASSAU RIVER |
| 12 | APALACHICOLA RIVER |
| 13 | OCHLOKONEE RIVER |
| 14 | PENSAQUOLA BAY |
| 15 | ST MARKS RIVER |
| 16 | AUGULLA RIVER |
| 17 | PERDIDO BAY |
| 18 | WITHLACOOCHEE RIVER,NORTH |
| 19 | ST ANDREWS BAY |
| 20 | ALAPAHA RIVER |
| 21 | SUWANNEE RIVER, UPPER |
| 22 | ST JOHN'S RIVER, LOWER |
| 23 | E CONFNA-FENHLOWAY |
| 24 | SUWANNEE RIVER, LOWER |
| 25 | NEW RIVER |
| 26 | EAST COAST, UPPER |
| 27 | SANTA FE RIVER |
| 28 | ST ANDREWS BAY |
| 29 | APALACHICOLA BAY |
| 30 | OKLAWAHA RIVER |
| 31 | WACCASASSA RIVER |
| 32 | ST JOHN'S RIVER, UPPER |
| 33 | WITHLACOOCHEE RIVER,SOUTH |
| 34 | EAST COAST, MIDDLE |
| 35 | CRYSTAL RIVER TO ST. PETE |
| 36 | KISSIMMEE RIVER |
| 37 | HILLSBOROUGH RIVER |
| 38 | TAMPA BAY |
| 39 | PEACE RIVER |
| 40 | ALAFIA RIVER |
| 41 | INDIAN RIVER, SOUTH |
| 42 | LITTLE MANATEE RIVER |
| 43 | MANATEE RIVER |
| 44 | SOUTHEAST FLORIDA COAST |
| 45 | SARASOTA BAY |
| 46 | MYAKKA RIVER |
| 47 | FISHEATING CREEK |
| 48 | TAYLOR CREEK |
| 49 | LAKE OKEECHOBEE |
| 50 | CALOOSAHA TO CHE RIVER |
| 51 | CHARLOTTE HARBOR |
| 52 | EVERGLADES WEST COAST |



0 25 50 100 Miles

Florida Watersheds



LEGEND

- CANALS
- NORTHERN EVERGLADES
- EVERGLADES PROTECTION AREA
- STORMWATER TREATMENT AREAS
- MICCOSUKEE INDIAN RESERVATION
- BIG CYPRESS SEMINOLE INDIAN RESERVATION
- ROTENBERGER AND HOLEY LAND WILDLIFE MANAGEMENT AREAS

Top Ten Watershed Tips

1. Conserve water every day—take shorter showers, fix leaks, and turn off the water while brushing your teeth.
2. Don't pour toxic household chemicals down the drain—take them to a local hazardous waste collection center instead.
3. Use hardy plants in your yard that require little or no watering, fertilizers, or pesticides.
4. Test your soil before applying fertilizer—it might not need it!
5. Recycle yard waste in a compost pile and leave grass clippings on the lawn.
6. Use surfaces like wood, brick, and gravel for decks, patios, and walkways. They allow rain to soak in, not run off.
7. Never pour used oil or antifreeze into the storm drain or the street. Recycle them at your local service station.
8. Pick up after your dog and dispose of the waste in the toilet or the trash.
9. Drive less—walk or bike instead.
10. Adopt Your Watershed! Learn more at www.epa.gov/adopt.



You Can Help Your Watershed!

**We all
live
in a
watershed—
an area of
land that drains
rain and snow
to a stream, lake,
wetland, estuary,
or the ocean.
Pollution
washed from
the land is a
leading reason
why many of
our watersheds
are in trouble.**



Chapter III

Stormwater Management

The ultimate goal of stormwater management is to maintain the health of streams, lakes, rivers, and other water sources as well as aquatic life. Stormwater managers also wish to provide opportunities for human uses of water by mitigating the effects of urban development. To achieve this goal, stormwater management strives to maintain the natural hydrologic cycle, prevent an increased risk of flooding, prevent undesirable stream erosion, and protect water quality. The federal Clean Water Act (CWA), directs all municipalities to improve stormwater quality and protect watersheds, rivers, streams, and drinking water sources. The City of Sweetwater Public Works Department coordinates the citywide response to the federal and state stormwater permits that require the City to reduce stormwater pollution, and oversees other programs that respond to water quality requirements.

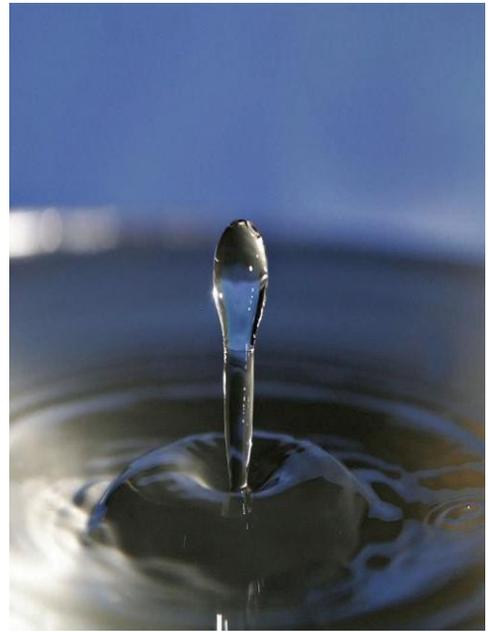


Rules and Regulations: NPDES

In 1972, amendments to the Clean Water Act prohibited discharge of any pollutant from a point source into U.S. waters. The USEPA regulates stormwater through the National Pollutant Discharge Elimination System (NPDES), pursuant to subsequent amendments to the Clean Water Act.

Florida's NPDES Stormwater Program in October 2000, EPA authorized the Florida Department of Environmental Protection (DEP) to implement the NPDES stormwater permitting program in the State of Florida (in all areas except Indian Country lands).

DEP's authority to administer the NPDES program is set forth in Section 403.0885, Florida Statutes (F.S.). The NPDES stormwater program regulates point source discharges of stormwater into surface waters of the State of Florida from certain municipal, industrial and construction activities. As the NPDES stormwater permitting authority, DEP is responsible for promulgating rules and issuing permits, managing and reviewing permit applications, and performing compliance and enforcement activities.



Three stormwater activities are regulated: municipal separate storm sewer systems (MS4s), industrial activities and construction activities.

Issued in 1990 under the Clean Water Act, Phase I of the USEPA's stormwater program relies on NPDES permit coverage to address stormwater runoff from:

- Medium and large municipal separate storm sewer systems (MS4s) generally serving populations of 100,000 or greater
- Eleven categories of industrial activity
- Construction activity disturbing 5 or more acres of land

Phase II regulates construction activities covering between 1 and 5 acres and regulated small MS4s. Phase II expands the Phase I program to include additional operators of MS4s in urbanized areas and operators of small construction sites. Phase II requires such operators, through the use of TPDES permits, to implement programs and practices to control polluted stormwater runoff. Phase II is intended to reduce even further adverse impacts to water quality and aquatic habitat; it institutes the use of controls on the unregulated stormwater discharge that have the greatest likelihood of causing continued environmental degradation.

Rules and Regulations: NPDES

Under Phase I of the TPDES Stormwater Program, operators of large and medium MS4s require a TPDES permit authorizing them to discharge pollutants. Medium and large MS4 operators must submit comprehensive permit applications and are issued individual permits. A proposed stormwater management program must be developed that would meet the standard of reducing pollutants to the maximum extent practicable. Stormwater management programs for medium and large MS4s include measures to:

- Identify major outfalls and pollutant loadings
- Detect and eliminate non-stormwater discharges to the system
- Reduce pollutants in runoff from industrial, commercial, and residential areas
- Control stormwater discharges from new development and redevelopment areas

Only a select subset of small MS4s, referred to as regulated small MS4s, are required to have Phase II TPDES stormwater permits (No. TXR 040000). Regulated small MS4s are defined as (1) all small MS4s located in urbanized areas as defined by the Bureau of the Census and (2) small MS4s located outside of a UA but designated by TCEQ. An urbanized area comprises one or more central places plus the adjacent densely settled surrounding area (urban fringe), together having a residential population of at least 50,000. Regulated small MS4 operators may choose to be covered by an individual permit, by a general permit, or by a modification of an existing Phase I MS4's individual permit. Some regulated small MS4s in UAs may be eligible for a waiver from NPDES stormwater permitting requirements.



Regulated small MS4s are required to design their programs:

- To reduce their discharge of pollutants to the maximum extent practicable
- To protect water quality
- To satisfy the appropriate Clean Water Act water quality requirements

Rules and Regulations: Stormwater Pollution Control Ordinance



In March 2015, the City Commission adopted a new Storm Water Pollution Control Ordinance No. 4006. The primary purpose of this ordinance is to maintain and improve the quality of surface and ground water. The Stormwater Pollution Control Ordinance prohibits the discharge of non-storm water. It also requires that management practices be implemented for certain industrial, commercial, residential, and construction activities to prevent or minimize pollutants in the rainfall runoff entering the city's storm drain system and streams.



Environmental Compliance and Field Operations

The City of Sweetwater has been divided into three zones. Each zone has an inspector that performs random inspections to oversee stormwater pollution and maintenance activities. Their duties include conducting inspections and preparing related technical reports to meet federal and state requirements; responding to hazardous materials incidents or releases to stormwater systems; pipe maintenance and cleaning, improved channelization efforts, and investigating citizen complaints.

Duties also include monitoring and inspections for stormwater activities related to construction, industrial, commercial, and agricultural sites.



Stormwater Utility Fee

WHAT DOES THE UTILITY INTEND TO ACCOMPLISH?

The Stormwater Utility will improve the maintenance of existing local drainage systems and will develop a comprehensive master plan for the design and actual construction of major capital improvements and system betterment throughout the city's public storm sewer system in accordance with federal and state requirements. Specifically, drainage systems will be improved so that the amount of pollutants discharged into surface waters is reduced.

In addition to attacking pollution problems, the Stormwater Utility will work to further reduce the flooding of roadways and developed property. As many residents of Sweetwater have experienced, with our subtropical climate here in southeast Florida we average sixty (60) inches of rainfall annually; however, most of the rainfall is concentrated within a few months of the year. As a result, during the rainy season, frequent and substantial flooding occurs in many areas of the City. The stormwater utility will operate and maintain the public stormwater management system throughout the City.

The focus of the Stormwater Utility, of course, is on storm sewers. There are, however, generally two separate and distinct types of sewer systems: storm sewers, and sanitary sewers. For the sake of clarity, here are basic descriptions of both. A storm sewer is a sewer (an underground pipe or open channel) designed to carry storm waters, surface run-off, street wash waters, and drainage. In contrast, a sanitary sewer is an underground pipe that carries liquid and water-carried solid matters from residences, commercial buildings, industrial plants and institutions. Many people associate "sanitary sewers" with the transport of wastes from sinks and toilets.

The Sweetwater Stormwater Utility shall provide significant environmental and flood protection benefits for the people and property of Sweetwater by addressing the problem of stormwater run-off. Inadequate drainage systems are major contributors to the Pollution of Biscayne Bay and other surface waters. Now, more than ever, local governments must respond to greater challenges as it protects the public's health, safety, and welfare. The federal and state governments provide less financial assistance, yet both tiers of government have enacted legislation addressing stormwater management, which demands local government action. Funding must be sought at the local level.



Stormwater Utility Fee



HOW DOES THE UTILITY OPERATE

The Stormwater Utility is supported by user fees, which are to be used only for the management, maintenance, and improvement of the public stormwater system. Specifically, user fees are paid by the owner, tenant, or occupant of developed property pursuant to City Ordinance. The Code defines “developed property” to mean “any parcel of land which contains an impervious area. In this way, the costs of addressing the pollution and flooding problems of stormwater run-off are associated with the sources, which are the impervious areas of developed properties.

The Stormwater Utility fee rate is based upon a standard which is referred to as an “Equivalent Residential Unit” (ERU).

The Stormwater Utility fee rate, was set by the City Commission at \$ 5.00 per month, per ERU. That is the basis of the utility billing system.

Billing is divided into two (2) categories: residential properties and non-residential properties. All residential units are charged the user fee rate for one ERU, In other words, the stormwater utility user fee of \$4.00 per month applies to each residence for example, to each single-family home, each condominium, each apartment, each half of a duplex, each townhouse, or to each mobile home .

On the other hand, nonresidential properties are charged a user fee, which is specific for the actual, calculated, impervious area of the nonresidential developed property. The fee is determined by applying this formula: calculate the impervious area of the parcel of land; divide it by 1,548 square feet (which is the value assigned to one ERU) Multiply the quotient (that answer) by the rate for one ERU (\$4.00) The result is the monthly fee for that nonresidential property. Billing is accomplished in the following way. The stormwater utility fee will appear as a line item on the monthly, or bimonthly, statement issued by the Water and Sewer Department. For those residential bills that are rendered bimonthly, the fee will also be computed bimonthly: \$2.00 per month for two months equals \$4.00 per billing cycle.

In conclusion, the City of Sweetwater Stormwater Utility will help to prevent the contamination of surface and ground waters from stormwater run-off; in addition it will decrease the risk of flooding. This program will help to ensure that both the environment and public health will be safeguarded for generations to come.

Chapter IV

Pollution Prevention for Residents

One of the key ways to achieve the goals of stormwater management is prevention. Preventing stormwater (or non-point source) pollution is more cost effective via **front-of-pipe rather than end-of-pipe measures**. That is, the best way to prevent pollution from entering the storm sewer system is to manage it *before it enters the storm drain*. Municipalities, businesses and individuals can put pollution prevention measures into practice.

This chapter includes information on **Best Management Practices (BMPs)** that can be utilized in preventing stormwater pollution around your home.

Pollution prevention measures and BMPs apply to everyday activities that occur inside and outside the home. These include the following categories: vehicle maintenance, lawn & garden care, pet waste, vehicle & pressure washing, swimming pool & spa drainage, litter prevention, **household hazardous waste**, tree planting, rain barrels, and rain gardens.

| POLLUTION PREVENTION | BMPs |
|---|---------------------|
| Home vehicle maintenance | Tree Plantings |
| Lawn & garden care | Rain Barrels |
| Pet waste | Rain gardens |
| Vehicle & pressure washing | Backyard Composting |
| Swimming pool & spa drainage | |
| Litter prevention & proper disposal of household hazardous wastes | |

Key Terms:

FRONT-OF-PIPE: Methods used to remove contaminants from air, water, waste or other similar product before they enter ecological systems.

END-OF-PIPE: Methods used to remove already formed contaminants from a stream of air, water, waste, product or similar. These techniques are called 'end-of-pipe' as they are normally implemented as a last stage of a process.

BEST MANAGEMENT PRACTICES (BMPs): permanent controls to minimize the discharge of pollutants to the MS4 or storm sewer system.

HOUSEHOLD HAZARDOUS WASTE (HHW): Leftover household products that contain corrosive, toxic, ignitable, or reactive ingredients are considered to be "household hazardous waste" or "HHW." Products, such as paints, cleaners, oils, batteries, and pesticides, that contain potentially hazardous ingredients require special care when you dispose of them.



Home Vehicle Maintenance

At-home vehicle maintenance is a common practice. Many individuals choose to repair or maintain their vehicles at home rather than visit an auto repair service center. While the actual maintenance work of personal vehicles is not a problem, the byproducts that result from this kind of work can add significant amounts of pollutants into the storm sewer system. These byproducts (i.e. Oil, grease, brake fluid, gasoline, diesel, etc), all contain toxins that are harmful to fish and birds, aquatic vegetation, wildlife and humans. Vehicles at home can allow these byproducts to leach into the street and then into the storm sewer system, transporting these pollutants to area waterways.



When repairing or maintaining your vehicle at home, adopt these few simple practices that can reduce the detrimental impacts of pollutants on our local waterways. And remember two simple rules:

1. Only rainwater may be discharged to the storm sewer system.
2. Minimize the contact of rainfall & runoff with pollutants. Do this by keeping hazardous materials covered and by managing wastes responsibly.

Your Work Area

Be aware of where you work. Any drips or spills on the ground can be carried away by rainwater to a storm drain and into a nearby waterway. So:

- NEVER work on a vehicle in the street or near a storm drain.
- Work on a flat concrete surface where you can easily clean up accidental spills.
- NEVER hose down your work area unless the resulting wash water is contained and disposed of properly.
- Keep storage and work areas clean and dry.



Replacing brakes and brake parts

Follow these tips when replacing brakes and brake parts.

- Don't hose down brake pads, rotors or drums. Remember, brake pads contain copper, which can erode as the pads wear and contribute to stormwater pollution.
- Use shop cloths to wipe as much brake dust as possible from rotors and drums before using brake cleaner fluid.
- Recycle cleaner fluid by using a drip pan.
- Never discharge cleaning solutions from cleaning into the storm sewer system.

Recycling

You can recycle many of the waste products that come from maintaining your vehicle at home, including:

- Antifreeze
- Batteries
- Brake Fluid
- Degreasers
- Gasoline
- Motor Oil
- Oil Filters
- Transmission Fluid.

Changing Your Oil or other Fluids

Follow these tips for changing your oil and other fluids.

- Use funnels or pumps when handling liquid products or wastes to avoid spills.
- Capture vehicle fluids in separate drip pans or containers.
- Drain and recycle used oil filters. Poke holes in the filter and let it drain into your oil pan for several hours before you recycle them.
- If spills occur, use kitty litter, sawdust, or oil absorbent to clean spills. Apply to the spill, sweep it up and dispose of the waste in the trash.
- NEVER sweep or wash used oil products or other fluids into the storm sewer system.
- Collect your used motor oil and other fluids in separate containers and transport to the Environmental Collection Center. Be sure to verify that your waste materials are accepted at the local collection center.

Hazardous Products Associated with Home Vehicle Maintenance or Repair

| <i>Product</i> | <i>Hazardous Property</i> |
|--------------------------------|---------------------------------|
| Antifreeze | Toxic/Flammable |
| Auto Batteries | Corrosive /Toxic |
| Auto Paint & Primers | Flammable /Toxic |
| Brake and Transmission Fluid | Flammable /Toxic |
| Carburetor Cleaner | Corrosive/Toxic |
| Engine Cleaner and Degreasers | Flammable/Toxic |
| Gasoline, Diesel, and Kerosene | Flammable/Toxic/Highly Volatile |
| Motor Oil | Toxic/Flammable |
| Used Motor Oil Filter(s) | Toxic |
| Windshield Washer Fluid | Toxic |

STORMWATER FACT:

A single quart of oil can pollute 250,000 gallons of drinking water. (Source: Natural Resources Defense Council)

Lawn and Garden Care



Yard Waste entering storm drains or streams and other water sources, increases the risk of flooding and adds pollutants to the environment. Not only does yard waste cause blockages to the drainage system which can lead to localized flooding, it can also quickly “super-fertilize” streams and lakes and can lead to algae blooms and fish kills. Sweeping or blowing grass clippings, fallen leaves, or other yard waste into the street or down the storm drain can cause serious damage to the storm sewer system and to the water resources to which storm drains lead.

Leaves, grass clippings and other yard waste (depending on type) should be composted, left on your lawn, or placed in acceptable containers for curbside pick-up. If you have to use fertilizers, pesticides, and herbicides, carefully read all labels and apply products sparingly. According to surveys conducted by the Center for Watershed Protection, over 50% of lawn owners fertilize their lawns, yet only 10% to 20% perform soil tests to determine whether fertilization is even needed (CWP, 1999). Conduct a soil test on your lawn and follow the practices listed here to reduce the need to fertilize on your lawn



**Leaves don't
belong in the
stormdrain**





Clean Waters

Starting in Your Home and Yard

Conservation Landscaping for Water Quality

Clean Waters is a collaboration of the Connecticut Sea Grant Extension Program and the University of Connecticut Cooperative Extension System's NEMO Project, educating individuals about the impacts of everyday activities on water quality and simple techniques that help protect water resources from the home well to Long Island Sound.

Most gardeners want to be good "citizens of the Earth" but also want great-looking gardens that don't take full-time help or a fortune to maintain. Can they have it both ways? Conservation Landscaping promotes landscape management techniques and philosophies that work with nature to reduce pollution and encourage wildlife habitat. It encourages yard care practices that include using less fertilizers and pesticides, reducing lawn areas, and utilizing native plants. The results are less overall maintenance and less water use in the suburban landscape. This fact sheet suggests practical techniques to assist in evaluating your landscape and maintenance practices. Simple changes may be all that is needed to help your landscape contribute to the health of our environment and the protection of water quality.

WHY IS CONSERVATION LANDSCAPING IMPORTANT?

A great majority of plant culture or gardening in the United States is devoted to growing ornamental plants and turf. More than 90 million households in the United States are involved in some form of gardening. Every gardener is a landscape manager, even if they never knew it. On a cumulative basis, the landscaping practices of these home landscape managers can pose a huge threat to naturally functioning ecosystems. The excessive use of fertilizers and pesticides, and irrigation practices that wash these and other chemicals, as well as pathogens (bacteria and viruses) from animal waste and eroded soil from the home landscape to local waters, create polluted runoff or non-point source pollution.

Traditional landscaping and gardening practices, along with suburban land development in the United States, have increasingly impacted the remaining natural ecosystems. To reconnect plant and animal

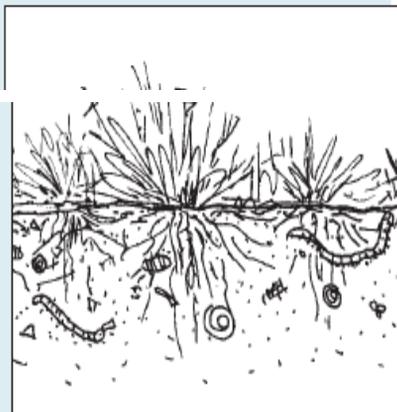
species in the remaining natural areas and rebuild ecosystems requires restoring the ecology of individual back yards. Conservation landscaping techniques and practices are systems of gardening that use many of the same principles that natural ecosystems follow. Conservation landscaping is about reducing waste, energy use and materials. It is about observation of nature at work. Its purpose is to design and create systems that imitate nature and turn problems into solutions.

LAYING THE GROUNDWORK

Conservation landscaping begins with understanding the soil. Soil quality affects nearly everything that is part of the landscape – trees, flowers, shrubs and lawn areas. Creating and maintaining good soil quality through thoughtful management is the key to conservation land-

scaping. Good, healthy soil is full of earthworms, microorganisms,

bacteria and other forms of life. This life feeds on organic matter, which it decomposes into humus, a rich, dark material that holds both moisture and nutrients in the soil. Soil pH (acidity/alkalinity levels) and fertility (nutrient availability) can be evaluated by analyzing soil samples from different soil locations throughout the landscape. Together they determine what plants will thrive in a particular landscape. Soil pH can be adjusted by the addition of limestone or gypsum (to raise pH) or iron sulfate (to lower pH for



acid-loving plants). Soil fertility can be improved by incorporating organic matter such as grass clippings or leaves into the soil. Applications of compost, which includes all the organic nutrients to keep soil life healthy, also helps plants thrive. As a natural fertilizer, compost has its own time release feature – nutrients are dispensed slowly, feeding the soil and plants gradually and preventing water pollution from nutrient runoff.

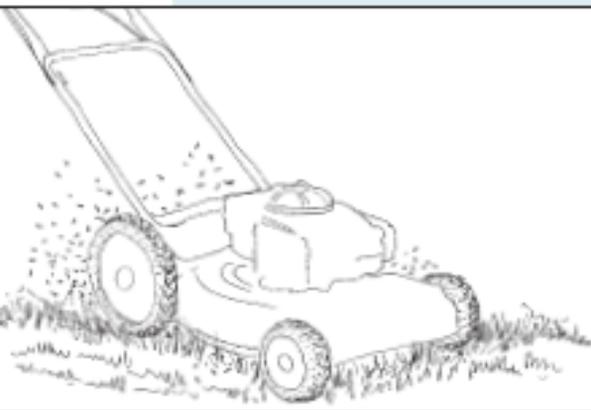
ON-SITE ORGANIC RECYCLING

Most gardeners know the value of recycling their grass clippings, plant prunings and leaves by com-

posting, but many people still buy commercial fertilizers because they don't have enough compost. Other people give their leaves away in the fall by taking advantage of municipal leaf pick-ups or paying landscaping

companies to clean off their lawns because they think they have no room for a leaf compost pile. Then they pay for bags of bark mulch to spread under shrubs and trees and in garden beds. Instead, they could chop the leaves with a mulching mower and rake them into the landscaping beds to use as mulch. Natural forest ecosystems function this way. They were the first "organic gardeners", recycling their own leaves and fallen twigs or branches.

Another way to recycle organic matter, eliminate large compost piles and save yourself a lot of time is to create beds or areas in your landscape where materials can be recycled right where you are mowing or raking. Increasing the size and number of land-



Judy Roberts-White

scape beds helps decrease the size of the lawn (and the need to mow, rake, fertilize, or water). These beds can be planted with groundcovers that add landscape interest but still require less maintenance than grass or true gardens.

PREVENT BARE SOILS

An important part of protecting the soil and the environment is maintaining a healthy vegetative cover on the land surface. Bare, unvegetated land areas are often eroded by wind and water, leading to soil and nutrient loss and water pollution problems down slope. Vegetative covers can consist of grasses, vines, groundcovers, mulches, or vegetables and herbs, as long as the soil surface is completely covered.

LAWN ALTERNATIVES

In many landscape situations, grass may not be the best choice as a vegetative cover. It may have a hard time growing successfully or it may be hard to mow and maintain, so a different ground cover may be more suitable. Excellent locations for alternative ground covers include areas with steep slopes, wet or shady areas and sites with easily erodible soils. When carefully selected and planted, ground covers can improve infiltration of water

into the soil, slow stormwater runoff and reduce landscape maintenance needs. Ground covers come in a variety of textures and colors, many with beautiful blooms. In addition to ground covers, other land-

scaping techniques help reduce total lawn area, including:

- Plant a wildflower meadow to provide a colorful, low-maintenance alternative to lawns while creating habitat for birds, butterflies and small animals.
- Wood decks and brick-on-sand patios offer cozy outdoor seating while allowing water to filter through to the underlying soil.
- Flowing water features introduce sound and texture into the landscape and attract wildlife.

Fertilizers & Pesticides

Fertilizers are essentially nutrients used by plants to live. Most fertilizers contain nitrogen, phosphorus, and potassium but can contain other elements as well.

Just like humans, plants can only use so much food. Fertilizer that is not used by the plant is available to mix with rain and become stormwater pollution. Nutrients from fertilizers, like nitrogen and phosphorus, promote algae blooms and excessive plant growth in water. Algae deplete oxygen, making it unavailable to fish and other aquatic life. Algae blooms and excessive plants also limit much needed sunlight.



Fertilizer Tips:

- **TEST** your soil to determine the type of fertilizer needed.
- **USE** fertilizers sparingly and apply fertilizers exactly where you want them.
- **SLOW RELEASE (ORGANIC) FERTILIZER** does not have to be applied as frequently and the risk of burning your grass is reduced.
- **LEAVE** grass clippings on your lawn as natural fertilizers.
- **STORE** fertilizers in areas that are covered to avoid mixing them with rain.
- **DO NOT** apply fertilizer if rain is predicted or on frozen ground or dormant lawns.
- **WASH** spreader equipment on a pervious (penetrable) vegetated area, like the lawn, to allow for the natural absorption of excess fertilizer

Pesticide Tips:

- ◀ **DO NOT** apply any pesticides if rain is predicted.
- ◀ **SWEEP** any pesticides from paved surfaces onto your lawn.
- ◀ **READ** the label instructions before applying any chemical product.
- ◀ **SPOT TREAT** areas of pest damage instead of treating the whole yard. If you have fire ants, they may be controlled or eliminated by ant baits.
- ◀ **INSECTICIDAL SOAP** is an alternative to traditional pesticides.



Pets and Pet Waste

Pet waste left on streets, pavement, yards, driveways, or along the sides of the road does not magically disappear or fertilize the ground. Improperly disposed animal feces can be picked up by stormwater runoff and carried into storm drains or nearby water sources. Storm drains do not connect to sanitary sewer systems and treatment facilities, so pet waste can be the cause of significant stormwater pollution and present health risks to adults, children and other pets. Pets and children who play in yards or parks and those who garden in yards where pets defecate are at risk for infections from disease-causing viruses, bacteria and parasites found in pet waste.



Until your pet can do this...

You must do this...



STORMWATER FACTS:

1. The average dog releases 3/4 pound of waste per day or 274 pounds per year. North Central Texas is home to approximately 1.2 million dogs; that's over 900,000 pounds of waste per day!
2. A day's worth of poop from one large dog can contain 7,800,000 fecal coliform bacteria.

Some of the diseases that can be transmitted from pet waste to humans include:

- **Salmonellosis:** the most common bacterial infection transmitted to humans by other animals. Symptoms include fever, muscle aches, headache, vomiting, and diarrhea.
- **Toxocariasis:** roundworms usually transmitted from dogs to humans, often without noticeable symptoms, but may cause vision loss, rash, fever, or cough.
- **Toxoplasmosis:** A parasite carried by cats that can cause birth defects such as mental retardation and blindness if a woman becomes infected during pregnancy; also a problem for people with suppressed immune systems.
- **Campylobacteriosis:** a bacterial infection carried by dogs and cats that frequently causes diarrhea in humans.
- **Fecal Coliform Bacteria:** found in the feces of warm blooded animals; poses potential health risk for those exposed to it in water.

Car Washing

For many, car washing is a spring and summertime ritual. Often, citizens do not know that by washing off all of the grime that accumulates on their vehicles, that they might actually be causing harm to our local waterways.

When cars are washed on streets and driveways, that dirty water eventually ends up in rivers, streams, creeks, and lakes. Washing one car may not seem to be a problem, but collectively, car washing activity adds up to big problems for our local water sources. Pollution associated with car washing degrades water quality and also finds its way into **sediments, impacting aquatic habitats.**



The Problem

Washing your car is only a problem if you do not know where or how to do it correctly. The average homeowner uses 116 gallons of water to wash one car. Most commercial carwashes use 60 percent less water for the entire process than a homeowner uses just to rinse one car.

Outdoor car washing has the potential to result in high loads of nutrients, dirt, metals, and hydrocarbons entering our waterways as the detergent-rich water used to wash the grime off of cars flows down the driveway and the street. Dirty water containing soap, detergents, residue from exhaust fumes, gasoline, heavy metals from rust, metals and other elements from brake linings, rubber, trace amounts of benzene and chromium, and motor oils can wash off cars and flow directly to storm drains and into the nearest creek or stream where it can harm water quality and wildlife. Small concentrations of detergents in streams can kill fish and their eggs, as well as inhibit their ability to reproduce. Detergents can also destroy the natural protections fish have against bacteria and parasites and can severely damage a fish's gills. The phosphates from soap can also cause excess algae to grow in our waterways. Excessive algae growth makes water cloudy, green, unattractive, smelly, and unhealthy for swimming, boating, fishing, or drinking.

STORMWATER FACT:

Car washing is a pollution problem because many metals and automotive fluids are washed off along with the soapy water. Water does not disappear when it goes down the street. It usually enters a storm drain inlet, and then flows to a waterway. Even biodegradable soap can be toxic to aquatic habitats. Just one gallon of liquid soap will pollute 200,000 gallons of water.

The Best Alternative

The best way to minimize the environmental effects of washing your car at home is to use a **commercial car wash facility**. **Commercial carwash facilities are required** to treat their wash water discharge before releasing it to the sanitary sewer system where the water is treated prior to release back into our water sources. Some facilities even recycle their wash water—reusing it several times before sending it to the sanitary sewer and water treatment facilities. Changing the way you wash your car is something that you can do to make a difference in the quality of our water sources. Proper individual actions can result in significant water quality improvement when carried out by the majority. The individual citizen can easily and economically manage this source of stormwater pollution.

STORMWATER FACT:

Most car washing best management practices are inexpensive, and rely more on good housekeeping practices (where vehicles are washed, planning for the collection of wash water) than on expensive technology.



Car Washing Tips

Use a commercial car wash facility where wash water is treated and cleaned before it is returned to our waterways.

If you do wash your car at home:

- Wash it on gravel, grass, or other **permeable surfaces**. Avoid washing on concrete or asphalt unless it drains into a vegetated area.
- Use plain water with a coarse sponge or, phosphate-free, water-based cleaners only.
- Use a trigger nozzle on your hose or a bucket to conserve water.
- Always empty wash buckets into sinks or toilets, never into the street or storm drain.



Key Terms:

SEDIMENT: Sediment is any particulate matter that can be transported by fluid flow and which eventually is deposited as a layer of solid particles on the bed or bottom of a body of water or other liquid. Sedimentation is the deposition by settling of a suspended material.

PERMEABLE: PENETRABLE; having pores or openings that permit liquids or gases to pass through; porous; pervious.

COMMERCIAL CARWASH FACILITY: A place or business equipped for washing cars and other motor vehicles.

Pressure Washing

What is Pressure Washing?

Pressure washing uses mechanical equipment to create a high pressure stream of water, typically ejected from a hand-held wand or nozzle. This jet of water is used for cleaning a wide variety of surfaces and objects. Depending on the application, pressure washing may be conducted with or without heated water or added cleaners. In recent years, the use of pressure washing equipment has grown substantially.

Numerous contractors provide pressure washing as a service to others, businesses purchase their own units to use in their own operations and maintenance, and many homeowners rent units or purchase low cost equipment.

Pressure washing is used to clean many things around the home, including:

- Automobiles
- Driveways
- Home exteriors
- Sidewalks
- Garages
- Roofs
- Graffiti.

Pressure washing equipment is also used for stripping paint or for preparing and treating other types of surfaces.



STORMWATER FACT:

As a consumer who may employ pressure washing contractors, you can have a significant impact on the prevention of water pollution by simply choosing a contractor who follows pollution prevention guidelines and techniques. Keep in mind that as the consumer, you may also be held responsible for illegal discharges that occur on your property.

Key Terms:

PRESSURE WASHING: also known as power washing; cleaning with a machine that delivers a high-pressure water spray.

Swimming Pool and Spa Drainage

There are three options for draining your swimming pool. Please note that whichever method you choose, you must ***dechlorinate the water before draining*** occurs.

Here's how:

- Dechlorinate naturally: Allow the water to sit in the sun for 5–10 days without adding any chlorine; or
- Use a chemical dechlorination additive (contact your local pool store for options).
- Verify water is dechlorinated with a pool testing kit.

Option 1: Your Lawn

The Preferred Discharge Method

Drain ***dechlorinated water to the grass, turf*** or any area on your property that will allow the water to percolate into the ground, ***if and only if...***

- You do not cause flooding of your neighbor's property or any other adjacent property.
- The land area is sufficient to prevent erosion and runoff into a ditch, creek, or other conveyance (i.e. storm drain).
- You do not cause harm to the environment.

This water can be used to irrigate plants, saturate dry ground, or soak into mulched areas



Option 2: The Sanitary Sewer

Drain your pool to the sanitary sewer. Most in-ground pools have a drain line connected to the sanitary sewer which can be used once the pool water has been ***dechlorinated***.

Follow these steps:

- Locate the sanitary sewer cleanout on your property or an indoor drain such as a sink or bathtub.
- Using a hose, connect a siphon or sump pump that pumps no more than 12–20 gallons per minute.
- Pump the water from the pool or spa to the cleanout or indoor drain.
- Replace all cleanout covers when finished.

DO NOT drain swimming pool or spa water to your SEPTIC SYSTEM as it may cause system failure.

It is not advisable to connect a hose to your indoor toilet to drain your swimming pool or spa. In most cases, water being pumped from your pool will drain faster than the time needed for flushing and refilling of the commode.

If you are unsure whether or not the discharge from your pool will create a problem in the sanitary sewer system or wastewater treatment plant, contact Miami Dade County Water and Sewer Department at 305-665-7488.

Steps for Draining Your Swimming Pool

Try to use your lawn or the sanitary sewer when draining your pool. Use a dechlorinator such as Sodium Thiosulphate (available at pool or hardware stores, or online) to remove all traces of chlorine before discharge.

Pool overflow water should be discharged onto land or other surface where there is no chance of it running off into streets or adjacent properties. If this is not possible, use the sanitary sewer system. The sewer system is designed to remove many pollutants from water. Draining should be done via pool plumbing, a gully trap, or sink. Do not discharge pool water when it is raining. Filtered backwash water **must not be discharged into the stormwater system.**



Option 3: The Storm Drain

Swimming pool water may be discharged to the storm drain **only after all of the** following conditions are met:

- Other disposal methods (i.e. sanitary sewer or landscaping) are not possible.
- The pool or spa is completely **dechlorinated.**
- The pH of the water is between 6 and 9.
- There is no discharge of filter media.
- There is no discharge of acid cleaning wastes.
- Discharge water will not pond or flow to neighboring properties.



REMEMBER: discharges into the City's Storm Drain System should be via pump and hose directly to the storm drain inlet or catch basin. DO NOT allow effluent to run down the street.

Litter Prevention and Household Hazardous Waste (HHW)

LITTER

Litter is an unsightly health hazard. However, many people do not realize that litter on the ground will pollute our water. Storm water systems are designed to take rainfall into the waterways and with the run off are carried trash, litter, and chemical waste. The nature of modern cities is to have extensive paved surfaces, resulting in litter that ends up in storm water systems. Whether someone dumps an auto ashtray at a curb, or drops a candy wrapper on the ground, the result is washed, untreated, into storm water systems and then into our waterways and onto our beaches.

Litter in storm water systems impacts people, animals, fish, and plants. The impact of litter and chemicals in our waterways on aquatic life and wildlife can be devastating: fish and other aquatic animals can be poisoned; wildlife can become entangled in or suffocate from litter while searching for food; and wildlife can contract diseases from eating or being exposed to rotting substances. Litter in the waterways can also reduce oxygen to levels that suffocate aquatic plants, animals, and fish. These conditions, in turn, affect the quality of the water we drink and the water in which we play.

STORMWATER FACTS:

1. Americans generate an estimated 1.6 tons of HHW per year and the average home can accumulate as much as 100 pounds of HHW in the basement and garage and in storage closets.
2. One quart of used oil can pollute an acre of surface water. 40



STORMWATER FACTS:

1. Cigarette butts are the most littered item worldwide. An estimated 450 trillion cigarette butts are said to be littered each year.
2. The City of Arlington conducts several litter clean-up events throughout the year.
3. Littering is illegal and the fine is up to \$500.



Tree Planting

Trees are not only a beautiful addition to the landscape, but they also provide invaluable benefits to cities.

They reduce heat by cooling and shading homes during the hot summer months, decreasing the amount of energy required to cool a home and its related electric bills.

Mature trees can actually cut summer cooling costs by 40% and tree-lined blocks can even decrease local temperatures. Trees naturally clean the air of pollutants and create a neighborhood noise buffer. Trees also improve stormwater management, reducing the amount of polluted stormwater that normally would go directly into storm drains. Tree roots also allow rainwater to filter back into the soil, recharging the often thirsty water table.



How to Plant Your Tree

It is important to carefully choose the site where you will plant your tree before digging. Pay special attention to where the tree will be planted making sure that it will have plenty of clearance from obstructions as the tree matures. Overhead power lines, underground lines, sidewalks, and buildings should be given consideration before choosing the planting site.



Correct soil preparation encourages root growth reducing the difficulties already challenging the young tree. Most roots spread through the top 12" of soil in a wide periphery around the tree. Slope the side of the hole and dig or deeply **rototill** an area around the hole at least twice the diameter of the container.

Plant the tree with the top of the root ball even with the surrounding terrain. When wet conditions or heavy soil are problems, raising several inches of the root ball above ground will aid the spread of lateral roots. Backfill with native soil or a mix of native soil and high quality top soil. Gently pack and soak with water. Add a 2-3" thick mulch layer around the tree out to the edge of the drip line, mounding the mulch at the outer edge to create a bowl effect. Be careful not to let the mulch touch the trunk of the tree.



Chapter V

Summing it Up: Preventing Pollution Starts with You

Pollution prevention and good stormwater management is essential to protecting water quality. All activities from agriculture, urban development, industrial, and RESIDENTIAL activities influence how much stormwater will enter our water sources and what potential pollutants it will carry. EVERYONE is responsible for working to reduce the impacts of stormwater runoff.

Remember these pollution solutions:

- **Do not dispose of household hazardous wastes in sinks, toilets, or storm drains.**
- Use a commercial carwash that treats or recycles its wastewater, or wash your car on your lawn so that water infiltrates the ground. Washing your car and degreasing auto parts in your driveway can send detergents and other contaminants through storm sewer systems.
- **Do not dump automotive fluids into storm drains. In some cases this has the same result as dumping these materials directly into a water body.**
- Repair leaks and dispose of used auto fluids and batteries at designated drop-off or recycling locations.
- When walking your pet, remember to pick up wastes and dispose of them properly. Pet waste can be a major source of bacteria and excess nutrients in local waters. Flushing pet waste is the best disposal method.
- Use pesticides and fertilizers sparingly. Excess fertilizers and pesticides applied to lawns and gardens wash into storm sewers and pollute streams.
- Do not water your lawn too much, as it causes runoff.
- Compost or mulch yard wastes. Yard clippings and leaves can wash into storm drains and contribute nutrients and organic matter to streams.
- Use non-colored mulch from native trees whenever possible.
- Use pest control methods minimizing pesticide applications whenever possible.
- Cover piles of dirt or mulch used in landscaping projects.
- Inspect your septic system every 3 years and pump your tank as necessary. Leaking and poorly maintained septic systems release nutrients and pathogens—bacteria and viruses—that can be picked up by stormwater and discharged into nearby water bodies. Such pathogens can cause public health problems and environmental concerns.
- Volunteer in your City's next litter clean-up event.
- Attend public hearings or meetings on stormwater so that you can express your concerns.
- Report all stormwater violations to the City.
- Keep learning about stormwater runoff and tell a friend!



Stormwater Glossary of Terms

303 (d) Waterbody – A list of lakes, rivers, and streams that have been designated as **impaired** or threatened by a pollutant(s) for which one or more TMDLs are needed. Impaired means that the water is not meeting state water quality standards.

319 – The section of the Federal Clean Water Act that deals with nonpoint pollution.
Best Management Practice (BMP), nonstructural – Strategies implemented to control stormwater runoff that focus on pollution prevention such as alternative site design, zoning and ordinances, education, and good housekeeping measures.

Best Management Practice (BMP), structural – Engineered devices implemented to **control, treat, or prevent** stormwater runoff pollution.

Biofiltration – The use of vegetation (usually grasses or wetland plants) to filter and treat stormwater runoff as it is conveyed through an open channel or swale.

Bioretention – The use of vegetation in retention areas designed to allow infiltration of runoff into the ground. The plants provide additional pollutant removal and filtering functions while infiltration allows the temperature of the runoff to be cooled.

Buffer zone – A designated transitional area around a stream, lake, or wetland left in a natural, usually vegetated state so as to protect the waterbody from runoff pollution. Development is often restricted or prohibited in a buffer zone.

Catch basin – An inlet to a storm or combined sewer equipped with a sediment sump, and sometimes a hood, on its outlet pipe to the sewer. Catch basins can collect some of the sediment and debris washed off the streets, and help to provide a water seal against the venting of sewer gases. Catch basins should be cleaned out regularly to function properly. **Catchment** – See Watershed.

Combined sewer system – A sewer system that conveys stormwater runoff along with sanitary sewage and industrial waste.

Conveyance – The process of water moving from one place to another.

Detention – The storage and slow release of stormwater following a precipitation event. Detention is used for both pollutant removal, stormwater storage, and peak flow reduction. Both wet and dry detention methods can be applied.

Discharge – The volume of water that passes a given location within a given time period.

Erosion – Removal of soil particles by wind or water.

Eutrophication – Nutrient enrichment (nitrogen, phosphorus, and carbon) from sewage effluent, runoff, or atmospheric deposition to surface waters. This process can increase the growth potential for algae and aquatic plants. Excessive eutrophication can leave water bodies devoid of most life, impede navigation, and result in aesthetic nuisances.

Filter Strip – Grassed strips situated along roads or parking areas that remove pollutants from runoff as it passes through, allowing some infiltration, and reductions of velocity.

Floatables – Materials found in runoff that are buoyant, such as polystyrene, plastic, some organic material, or cigarette butts.

Groundwater – Water that flows below the ground surface through saturated soil, glacial deposits, or rock.

Hydrology – The science addressing the properties, distribution, and circulation of water across the landscape, through the ground, and in the atmosphere.

Illicit connection – Any discharge to a municipal separate storm sewer that is not composed entirely of stormwater and is not authorized by an NPDES permit, with some exceptions (e.g., discharges due to firefighting activities)

Illicit discharges – Discharges of non-stormwater to the storm drainage system. Examples are discharges from internal floor drains, appliances, industrial processes, sinks, and toilets that are connected to the nearby storm drainage system. These discharges should be going to the sanitary sewer system, a holding tank, an on-site process water treatment system, or a septic system.

Impervious surface – A surface that cannot be penetrated by water such as pavement, rock, or a rooftop and thereby prevents infiltration and generates runoff.

Imperviousness – The percentage of impervious cover within a defined area.

Impoundment – A natural or man-made containment for surface water.

Infiltration – The process or rate at which water percolates from the land surface into the ground. Infiltration is also a general category of BMP designed to collect runoff and allow it to flow through the ground for treatment.

Integrated Pest Management (IPM) – The practice of using biological and physical measures to control pests while minimizing or eliminating the use of synthetic chemical pesticides.

National Pollutant Discharge Elimination System (NPDES) – National Pollutant Discharge Elimination System, the two-phased surface water quality program authorized by Congress as part of the 1987 Clean Water Act. This federally mandated system is used for regulating point source and nonpoint stormwater discharge. The second phase of the program requires local governments to implement the following six minimum measures:

1. Public Education and Outreach
2. Public Participation/ Involvement
3. Illicit Discharge Detection and Elimination
4. Construction Site Runoff Control
5. Post-Construction Runoff Control
6. Pollution Prevention / Good Housekeeping

Natural buffer – A variable width area maintained with natural vegetation between a pollutant source and a waterbody that provides natural filtration and other forms of protection.

Nonpoint-source pollutants – Pollutants from many diffuse sources. Nonpoint-source pollution is caused by rainfall or snowmelt moving over and through the ground. As the runoff moves, it picks up and carries away natural and human-made pollutants, finally depositing them into lakes, rivers, wetlands, coastal waters, and even underground sources of drinking water.

Outfall – The point of discharge from a river, pipe, drain, etc. to a receiving body of water.

Point-source pollutants – Pollutants from a single, identifiable source such as a factory or refinery.

Pollutant loading – The total quantity of pollutants in stormwater runoff.

Polluted runoff – Rainwater or snowmelt that picks up pollutants and sediments as it runs off roads, highways, parking lots, lawns, agricultural lands, logging areas, mining sites, septic systems, and other land-use activities that can generate pollutants.

Porous pavement and pavers – Alternatives to conventional asphalt that utilize a variety of porous media, often supported by a structural matrix, concrete grid, or modular pavement, which allow water to percolate through to a sub-base for gradual infiltration.

Retention – The process of collecting and holding surface and stormwater runoff with no surface outflow.

Runoff – Water from rainfall, snowmelt, or otherwise discharged that flows across the ground surface instead of infiltrating the ground.

Sanitary sewer system – Underground pipes that carry only domestic or industrial wastewater to a sewage treatment plant or receiving water.

Sedimentation – A solid–liquid separation process utilizing gravitational settling to remove soil or rock particles from the water column.

SSO (sanitary sewer overflow) – Wastewater entering sanitary sewers may be so great, because of blockage, a lack of capacity, inflow and infiltration, or other reasons, that the collection system or sewage treatment plant cannot handle the increased flow. As a result, untreated sewage empties directly into receiving waters, often from manholes or up through sewer connections.

Storm sewer system – A system of pipes and channels that carry stormwater runoff from the surfaces of building, paved surfaces, and the land to discharge areas.

Stormwater – Water derived from a storm event or conveyed through a storm sewer system.

Stormwater utility – A utility established to generate a dedicated source of funding for stormwater pollution prevention activities where users pay a fee based on land–use and contribution of runoff to the stormwater system.

Surface water – Water that flows across the land surface, in channels, or is contained in depressions on the land surface (e.g. runoff, ponds, lakes, rivers, and streams).

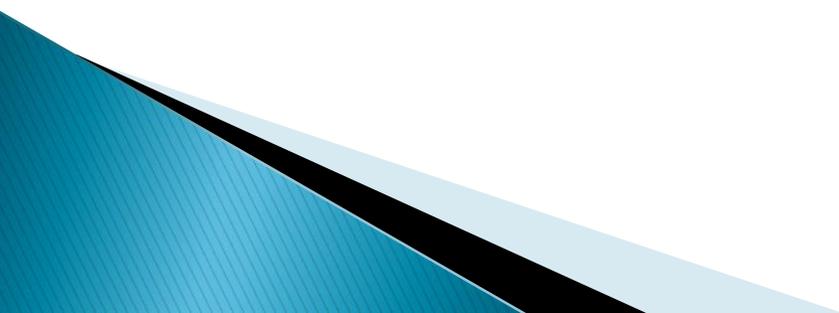
Swale – A natural or human–made open depression or wide, shallow ditch that intermittently contains or conveys runoff. Can be used as a BMP to detain and filter runoff.

Urban (metropolitan) runoff – Runoff derived from urban or suburban land–uses that is distinguished from agricultural or industrial runoff sources.

Water (hydrologic) cycle – The flow and distribution of water from the sky, to the Earth's surface, through various routes on or in the Earth, and back to the atmosphere. The main components are precipitation, infiltration, surface runoff, evapotranspiration, channel and depression storage, and groundwater.

Water quality – The biological, chemical, and physical condition of a waterbody; a measure of the ability of a waterbody to support beneficial uses.

Watershed – The land area, or catchment, that contributes water to a specific waterbody. All the rain or snow that falls within this area flows to the waterbodies as surface runoff, in tributary streams, or as groundwater.



*Welcome to the City of
Sweetwater*



Thank you

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